

B1

1. (Twice Amended) An image searching system comprising:

- an image database storing a plurality of database images, each of said plurality of database images having a plurality of features;
- a specifying controller for specifying a plurality of key images, each of said plurality of key images being specified by a user and having a respective plurality of features;
- an extracting controller for extracting common key image feature values for common key image features that are common to the plurality of key images;
- a calculating controller for comparing the common key image feature values, extracted by the extracting controller, with the respective feature values of the plurality of database images to thereby sequentially calculate similarities between each of the common key image feature values and respective ones of the database image feature values for each of the plurality of database images; and
- a searching controller for retrieving from the database at least one of the plurality of database images which is similar to the plurality of key images, based on a similarity calculated by the calculating controller.

2. An image searching system as claimed in Claim 1, wherein the extracting controller includes:

- an extracting algorithm for extracting a plurality of types of features from the plurality of key images specified by the specifying controller;
- a selecting algorithm for comparing the plurality of types of features extracted by the extracting algorithm, with the plurality of key images specified by the specifying controller to thereby select at least one of the types of the features; and
- a determining algorithm for determining the common key image features based on the at least one type of the features selected by the selecting algorithm.

3. An image searching system as claimed in Claim 2,

- wherein the selecting algorithm is operable to compare common types of the features of respective ones of the plurality of key images specified by the specifying controller,

wherein the determining algorithm is operable to calculate an average similarity value for the features of the plurality of key images with respect to the at least one type of the features selected by the selecting algorithm to thereby determine the average similarity value for each of the at least one type of the features.

4. (Twice Amended) An image searching system which comprises:

an image database storing a plurality of database images to be searched, each of said plurality of database images having a plurality of database image features;

a specifying controller for specifying a plurality of key images used to specify search conditions, each of said plurality of key images being specified by a user and having a plurality of key image features, each of said plurality of key images having a common feature value for each of said plurality of key image features;

a calculating controller for comparing the plurality of key images, specified by the specifying controller, with the plurality of database images to thereby calculate similarities between the common feature value for each of the plurality of key image features and a corresponding one of the plurality of database image features for each of the plurality of database images;

a selecting controller for retrieving a particular key image from the specified plurality of key images based on the similarities calculated by the calculating controller; and

a searching controller for retrieving images from the plurality of database images based on the similarity between the particular key image, selected by the selecting controller, and the plurality of database images.

5. An image searching system as claimed in Claim 4, wherein the selecting controller is operable to select as a particular one of the plurality of key images, a particular one of the plurality of key images which most resembles an image being searched for.

6. An image sensing system as claimed in Claim 5,

wherein the calculating controller is operable to calculate the types of the features of the plurality of key images and then operable to calculate degrees of similarity by comparing the key image features for each of the plurality of key images with corresponding database feature quantities of the database images for each type of the features,

wherein the selecting controller selects, as the particular key image, a one of the plurality of key images which most resembles an image being searched for with respect to an average value of the degrees of similarity calculated by the calculating controller for each type of the features.

7. (Twice Amended) An image searching system which comprises:

an image database storing a plurality of database images;

a specifying controller for specifying a plurality of key images specified by a user for specifying search conditions;

B1 a first calculating controller for comparing a feature value calculated for each common feature of the plurality of key images to thereby calculate a first degree of similarity for each of said plurality of database images;

a second calculating controller for selecting a particular key image from the plurality of key images and for comparing the particular key image with the plurality of database images to thereby calculate a second degree of similarity for each of the plurality of database images;

a third calculating controller for calculating a final degree of similarity for each of said plurality of database images for use in searching based on the first and second degrees of similarity calculated respectively by the first and second calculating controllers; and

a searching controller for retrieving at least one of the plurality of database images, which is similar to the particular key image, based on the final degree of similarity calculated by the third calculating controller for each of the plurality of database images.

8. An image searching system as claimed in Claim 7, wherein the third

calculating controller is operable to increase a weight of the first degree of similarity,

calculated by the first calculating controller, to a value greater than that of the second degree of similarity, calculated by the second calculating controller, to thereby calculate the final degree of similarity.

9. An image searching system as claimed in Claim 8, wherein the first calculating controller is operable to extract common features of the image that are common to all of the key images, and to compare those common features with respective database image features of each of the plurality of database images to thereby calculate the first degree of similarity.

10. An image searching system as claimed in Claim 9, wherein the second calculating controller is operable to select from the plurality of key images a key image most similar to a desired image and to calculate the second degree of similarity for each of the database images.

B1
11. (Twice Amended) An image searching method which comprises the steps of:
storing a plurality of database images in a database;
specifying a plurality of key images specified by a user for specifying search conditions;
extracting common feature values from the plurality of key images;
comparing the common feature values with the feature values of the plurality of database images to thereby sequentially calculate similarities between the common feature values and the database image feature values; and
retrieving from the plurality of database images at least one of the plurality of database images which is similar to the plurality of key images based on the similarities for each of the plurality of database images.

12. An image searching method as claimed in Claim 11, wherein the extracting step includes the sub-steps of:
extracting a plurality of types of features from the plurality of key images;

comparing the features from among the plurality of key images to thereby select at least one of the types of the features; and
determining common features based on the at least one type of the features.

13. An image searching method as claimed in Claim 12,
wherein the step of comparing includes comparing features of the plurality of key images, and

wherein the step of determining includes calculating an average value of the features of the plurality of key images with respect to the types of the features to thereby determine a calculated average value as representing the common features.

14. (Twice Amended) An image searching method which comprises the steps of:

storing a plurality of database images in an image database, said plurality of database images each having a plurality of database feature values;

specifying a plurality of key images specified by a user for specifying search conditions, said plurality of key images having common features, said common features of said plurality of key images each having a key image feature value;

comparing the key image feature values of the plurality of key images with the plurality of database feature values of the plurality of database images to thereby calculate similarities between the key image feature values and the plurality of database image feature values;

retrieving a particular key image from the plurality of key images based on the similarities; and

retrieving images from the database images based on the similarity between the particular key image and the plurality of database images.

15. An image searching method as claimed in Claim 14,
wherein the step of specifying includes selecting as a particular one of the specified plurality of key images the key images which most resemble the database images being searched for.

16. An image searching method as claimed in Claim 15,

wherein the calculating controller is operable to calculate a plurality of types of the features from the plurality of key images to derive the common feature values and then to calculate a degree of similarity by comparing the common feature values of each type of feature with corresponding feature values of the plurality of database images for each type of feature, and

wherein the selecting controller selects, as the particular key image from the specified plurality of key images, the key images which most resemble the plurality of database images being searched with respect to an average value of degrees of similarities calculated by the calculating controller for each type of the features.

17. (Twice Amended) An image searching method which comprises the steps of:

storing a plurality of database images in an image database;

specifying a plurality of key images specified by a user for specifying search conditions, said plurality of key images each having a plurality of common feature values, each of said common feature values corresponding to one of the features of the plurality of key images;

comparing the common feature values of the plurality of key images with respective feature values of the plurality of database images to thereby calculate first similarities therebetween;

selecting a particular key image from the plurality of key images and comparing the particular key image with the plurality of database images to thereby calculate second similarities therebetween;

calculating a final similarity for use in searching based on the first and second similarities; and

retrieving one of the plurality of database images, which is similar to the particular key image, based on the final similarity.

18. An image searching method as claimed in Claim 17, wherein the step of calculating includes a step of increasing a weight of a degree of the first similarity to a

value greater than that of a degree of the second similarity to thereby calculate the final similarity.

19. An image searching method as claimed in Claim 18, wherein the step of comparing includes the step of extracting the features of the image which are common to all of the key images, and comparing the common feature values of those common features with respective feature values of each of the database images to thereby calculate the first similarities.

20. An image searching method as claimed in Claim 19, wherein the step of selecting includes selecting the key images most similar to the database image and to calculate the second similarity.

B1 21. (Twice Amended) A software program including computer-executable instructions stored on a recording medium, said program comprising:

instructions for storing a plurality of database images in a database;

instructions for specifying a plurality of key images specified by a user for specifying search conditions;

instructions for extracting common feature values of features of the plurality of key images;

instructions for comparing the common feature values with feature values of the plurality of database images to thereby sequentially calculate similarities between the common feature values of the plurality of key images and the database image feature values; and

instructions for retrieving from the plurality of database images at least one of the database images which is similar to one of the key images based on the similarities.

22. A software program including computer-executable instructions stored on a recording medium as claimed in Claim 21, wherein the instruction for extracting includes an instruction for extracting a plurality of types of the features from respective key images;

an instruction for comparing the feature values for the extracted types of features of each one of the plurality of key images with the feature values for the extracted types of features for each of the plurality of key images to thereby select at least one of the types of the features; and

an instruction for determining the common feature values based on the at least one type of the features.

23. A software program including computer-executable instructions stored on a recording medium as claimed in Claim 22,

wherein the instruction for comparing compares the features of same types among the plurality of key images, and

wherein the instruction for determining calculates an average value of the features of each of the plurality of key images with respect to the types of the features to thereby determine the calculated average value as the common feature values.

24. (Twice Amended) A software program including computer-executable instructions stored on a recording medium, said program comprising:

instructions for storing a plurality of database images in an image database, wherein said instructions for storing also include instructions for storing a plurality of database image feature values for each of the plurality of database images;

instructions for specifying a plurality of key images specified by a user having common feature values used to specify search conditions;

instructions for comparing the plurality of key images with the plurality of database images to thereby calculate similarities between common feature values of the plurality of key images and the database image feature values;

instructions for retrieving a particular key image from the specified plurality of key images based on the similarities; and

instructions for retrieving images from the plurality of database images based on the similarity between the particular key image and the database images.

25. A software program including computer-executable instructions stored on a recording medium as claimed in Claim 24,

wherein the instructions for retrieving include instructions to select as the particular key image one of the plurality of key images which most resembles the database images being searched for.

26. A recording medium as claimed in Claim 25,

wherein each of said plurality of key images and each of said plurality of database images has a plurality of features associated therewith,

wherein the instruction for comparing includes instructions to calculate a plurality of types of the features from the plurality of key images and then to calculate a degree of similarity by comparing the features of the plurality of key images with respective features of the database images for each type of the feature, and

wherein the instructions for retrieving include instructions for selecting, as the particular key image the key image which most resembles one of the database images with respect to an average value of the similarities for each type of the features.

27. (Twice Amended) A software program including computer-executable instructions stored on a recording medium, said program comprising:

instructions for storing a plurality of database images in an image database, said database images each having a plurality of database image feature values;

instructions for specifying a plurality of key images specified by a user for specifying search conditions, said plurality of key images each having a plurality of features;

instructions for calculating feature values for each of the plurality of key images from the plurality of features for each of the plurality of key images;

instructions for comparing the feature values of each of the plurality of key images with respective feature values of the plurality of database images to thereby calculate first similarities between the feature values of the plurality of key images and the feature values of the plurality of database images;

instructions for selecting a particular key image from the plurality of key images;
instructions for comparing the feature values of the particular key image with the
feature values of the plurality of database images to thereby calculate second similarities
therebetween;

instructions for calculating a final similarity based on the first and second
similarities; and

instructions for retrieving at least one of the plurality of database images, based on
the final similarity.

B4 28. A software program including computer-executable instructions stored on a
recording medium as claimed in Claim 27, wherein the instructions for calculating a final
similarity for each of the database images includes instructions for increasing a weighting
of the first similarities, to a value greater than that of the second similarities, to thereby
calculate the final similarity.

29. A software program including computer-executable instructions stored on a
recording medium as claimed in Claim 28, wherein the instructions for calculating include
instructions for extracting common features common to all of the key images, and include
instructions for comparing those common features with the plurality of database images to
thereby calculate the degree of first similarities.

30. A software program including computer-executable instructions stored on a
recording medium as claimed in Claim 29, wherein the instructions for calculating include
instructions for selecting the key images most similar to a desired image.

31. (Once Amended) An image searching method in an image database system
storing a plurality of database images which comprises the steps of:

B2 specifying a plurality of key images specified by a user for specifying search
conditions, said plurality of key images each having a plurality of key image features each
corresponding to at least one of a plurality of database features, said plurality of key
images having a plurality of common features which are common to all of the plurality of
key images;

calculating common key image feature values from the common features for each of the plurality of key images;

comparing the common feature values of the common features with corresponding database image features of the plurality of database images to calculate similarities therebetween;

retrieving a particular key image from the plurality of key images based on the similarities such that the particular key image retrieved is the key image which most resembles the database images being searched for; and

retrieving images from the plurality of database images which are most similar to the particular key image based on the similarity between the particular key image and the plurality of database images.

32. (Once Amended) A recording medium storing therein a computer-executable image searching program for searching an image database storing a plurality of database images, said program comprising:

B2 specifying a plurality of key images specified by a user for specifying search conditions;

calculating common feature values of the plurality of key images by comparing the plurality of key image features for each of the key images to determine feature values which are common to all of the plurality of key images;

comparing common feature values of the plurality of key images with the database image feature values of the plurality of database images to calculate similarities therebetween;

retrieving a particular key image from the specified plurality of key images based on the similarities; and

retrieving images from the plurality of database images based on the similarity between the particular key image and the plurality of database images,

wherein the particular key image is the one of the plurality of key images which most resembles a desired image.

33. An image searching method according to Claim 1,
wherein the similarity is determined by satisfying the following three equations:

1) $FQ_{\text{difference}} = |KIFQ_a - DI_b FQ_a|$

where $KIFQ_a$ is the key image feature quantity for one of the a number of feature quantities,

BZ where $DI_b FQ_a$ is the database image feature quantity for one of the a number of feature quantities for one of the b number of database images;

2) $FQ_{\text{distance}} = \sqrt{\sum (FQ_{\text{difference}})^2}$; and

3) $\text{similarity} = 1.0/FQ_{\text{distance}}$.
